THE USE OF ECONOMIC ANALYSIS IN THE MANAGEMENT OF PRODUCTION CREDIT ASSOCIATION MACHINERY RENTAL PROGRAMS

HONORS RESEARCH STUDY PROJECT

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INTRODUCTION

Farm production in the U.S. today is characterized by high investment in mechanization as the trend of machines replacing manual labor continues. In the past farmers bought the equipment they needed. With a decreasing emphasis on diversification and increasing emphasis on specialization, new technologies have developed machinery capable of substantially increasing productivity per man. The cost of this new equipment is only affordable to those who have the resources to use it. With inflation and the aforementioned trends, the U.S. investment in farm machinery has increased by $9.5 billion over the past five years (Irwin and Smith, 1972).

Farmers like industrialists are beginning to look at other alternatives besides buying the equipment outright as they increasingly face credit limits but need the control of the needed capital investment. Other alternatives include long term leasing (financial lease), short term leases (rentals), and custom hiring.

In 1971 the Farm Credit Act was passed which allowed local Production Credit Associations to operate machinery rental programs. Two pioneering associations in Mammoth Cave, Kentucky and Juneau, Wisconsin started such programs and met favorable reaction from the public and their customers. It appeared that by operating a program of this nature, a needed service could be provided.

THE PROBLEM

Production Credit Associations face many obstacles in successfully operating a machinery rental program. They have no prior experience with such a program. Their area of expertise is loaning money for farm production. Machinery management is the traditional area of expertise for farmers and farm equipment retailers. Along with this is the need for all equipment to be in the best operating condition. Field breakdown must be at a minimum to prevent customer dissatisfaction and lower gross income for the PCA. If the PCA can't get a return from the program that they would receive in interest from loans made, then the program may not be justifiable. As a cooperative owned by the borrowers, PCA management must choose between the member service aspect versus the opportunity cost of capital that is invested in the cooperative. The variables (unknowns) such as usage rates and expenses could fluctuate enough so that the differences could be profit or loss. Variables such as weather can affect usage rates considerably.

Although the rental program offers potential and pitfalls, there is a need for methods to better evaluate the rental program and its ability to generate profits.

STUDY OBJECTIVES

The primary objective of this paper is to develop information that will assist PCA rental program managers to better evaluate their total program by analyzing each implement for financial decisionmaking.

The more specific study objectives are as follows:

1. To identify the policies of a PCA rental program.
2. To develop analytical models capable of evaluating the value of selected machines that will be available for rental.
3. To investigate the impact of the net present value and internal rate of return methods of financial analysis on the evaluation of selected farm machines available for rental.

METHODOLOGY

The first phase of this study included the collection of data from various sources. Actual data was obtained from the Marion, Ohio PCA along with supplemental information from other local associations and the Federal Intermediate Credit Bank. Information was collected regarding estimated costs and receipts entailed in operating various implements included in these programs. The intent was to concentrate on evaluating each implement individually to better evaluate a total program for rental of farm machinery. The model used in this study closely approximates the current rental program of the Marion, Ohio PCA.

The second phase of the study consisted of using Net Present Value and Internal Rate of Return methods of financial analysis to objectively analyze selected implements and their estimated cash flows. The net present value of an investment is the present value of the net cash income minus the present value of the net cash outlay using the opportunity cost of capital as the discount rate. The net present value indicates how the proposed investment will affect the net worth of the business. The internal rate of

return on an investment is the rate of interest or discount rate that equates the present value of cash outflows for an investment with the present value of expected cash inflows. In this way alternative investments can be compared to determin which would yield the highest rate of return.

Both methods account for the time value of money concept (Nelson et al., 1973). This concept states that a dollar now is worth more than the prospect of receiving a dollar at some future date. There are three basic reasons for this concept. The first is the degree of uncertainty of the future. The promise of money in the future may not be fulfilled for any number of reasons while money received today is certain. Another reason is that there are alternative uses for money. Cash may be needed immediately for some other use and the person can't wait until next year to receive it. The third reason for the time value of money is inflation. Because of the rising price level in the U.S. in the last thiry years, today's dollar will have less purchasing power in the future. Another dimension of the time value of money is the fact that expenses incurred at future points in time are less costly than those incurred immediately (Willett and Penland, 1975). Delayed expenditures make it possible to channel the funds into profitable investments or for purposes of reducing interest expenditures during the interim until costs are actually incurred.

Interest represents the time value of money (Nelson et al., 1973). It is the price paid for the use of money or capital. Interest compensates the supplier of money or capital, for

uncertainty, for alternative uses of his capital, and for the loss of purchasing power due to inflation.

DEFINITIONS

For the sake of eliminating confusion certain words should be defined.

Financial Lease - A financial lease is a long term contractual Agreement between the lessee who acquires possession and the lessor who buys the equipment and places it with the lessee, retaining actual ownership. The lessee acquires temporary possession in exchange for an agreed upon payment. The lessee assumes the normal ownership functions of maintenance, insurance, and taxes and may have first claim on residual value via re-lease or purchase when the lease terminates (Willet and Penland, 1975).

Operating lease - Operating leases are written for short periods of time (hourly, daily, weekly, monthly). The distinguishing characteristic of this lease is that the lessor buys, sells, maintains, services, insures, keeps records, manages and performs most equipment ownership functions (Irwin and Smith, 1972). These leases are commonly referred to as rental and will be stated as such through the remainder of the paper. Contracts are cancelable by the Lessee, increasing the lessor's risk exposure. The rental fee is generally based on the length of time the lessee rents the equipment.

Renter or lessee - The individual, company, or corporation who or which acquires control of equipment under rental.

Rentor or lessor - The individual, company, or corporation who owns the equipment and makes it available to the lessee under terms and conditions established in a rental agreement.

According to the Farm Credit Act of 1971, the local PCA has two alternatives in organizing and maintaining it's rental program. The first alternative is the formal lease program. Formal leasing programs must be operated on a lease or a "break even" basis. In this type of program only PCA member-Borrowers are allowed to actively participate and rent the equipment. The second alternative is referred to as the public relations lease program. The local PCA is allowed to subsidize this rental program. Non-member usage is allowed with the main thrust of this program being advertisement member service, and community goodwill. Livestock trailers are an example of implements popularly and effectively used in this program.

EFFECTIVE FINANCIAL MANAGEMENT OF A PCA RENTAL PROGRAM USING ECONOMIC ANALYSIS

Each PCA that considers a machinery rental program faces key problem areas that must be evaluated carefully to insure success of the program. Answers are needed for questions of, How much to invest? What equipment to buy? How much to charge for rental? When to trade equipment? and, Whether or not to provide the services of delivery and if so at what cost charged to the customer?

The answers to the following questions form the backbone of the prlject hence the need to get the proper information on which to base decisionmaking. A mail survey-questionairre sent to potential users can be extremely valuable in pinpointing the needs of the farmers in the subject area. Important conclusions can be drawn regarding types of equipment needed, rental rate acceptance and amount of equipment needed.

Another important management technique is for the rental program manager to project cost estimates of the total operation along with average use figures. He then can proceed to determine per acre, per hour, and per day rental rates based on the objectives of the program. These rates must be evaluated periodically as conditions change.

The program, if approved by the board of directors, can be initiated with the investments in appropriate equipment. Total investment in a rental program is limited to 10% of total capital atock and surplus of the association by law (Farm Credit Act 1971).

Once the program has been implemented, the manager continues to face alternatives as he evaluates implements individually and the total operation as a whole. There are a variety of considerations that need to be made.

Usage Rate Considerations

Usage rate considerations must include the variables of weather conditions, and the needs of farmers in the area. Also important is the fact that some implements have only seasonal usage possibilities while others can be used year long.

Implements with seasonal usage would include tillage and harvesting equipment (plows, discs, harrows, choppers and combines). Their usage is confined to the spring and fall seasons. Seeding equipment has an even smaller potential for days of rental because of the timeliness factor associated with planting. A specialty item, rock pickers for example, can only be used after completion of primary tillage and before planting. This means that the potential for renting out a rock picker is approximately 30 days a year maximum. According to Jim McElroy of Marion, Ohio PCA, their offset disc (primary tillage) is rented out at full capacity at 1500-1600 acres a year for their area. He also noted that their no-till planter was rented out at capacity with 285 acres total for the year.

Implements that can be rented out year round include many, such as manure spreaders, tractors, skid loaders, trailers, mowers, etc. This would include such specialty equipment as bulldozers and backhoes. Although they are of a more general nature and have

the potential for year round rental, the manager must feel confident that the demand for usage of such equipment exists before including them in the program. Certain periods of the year when a minimum of field operations take place such as in summer and winter stimulate demand for this type of equipment.

One of the main reasons PCAs have entered the rental business is that such a program is needed. Meeting the farmers needs are the key to having the right implements available for rental. Machines needed will have the demand for rental. PCA rental managers need to determine what the needs of the farmers are and can do so by using questionaires. However, the manager must always keep in mind weather factors which cripple demand for equipment. For planting equipment bad weather narrows the number of potential days for rental. The weather will also force more shifting of equipment from one area to another as certain parts of the association will be able to operate in the fields while other areas will be too wet. This effect causes higher labor costs in transporting the equipment back and forth.

Cost Considerations

Cost considerations for the rental program include variable costs, fixed costs, delivery expenses, and uncertainty of future costs. In operating a program of this magnitude the question arises of the possibility of excessive wear and tear on the equipment. This could be due to having many different operators who may not know how to operate the machine correctly.

In today's world of higher costs of fuel, and labor these

expenses make delivery a losing proposition. To make matters worse, the renters may be spread out over many counties, depending on the size of the association. The trend of other businesses obsorbing their own delivery costs almost forces PCAs to keep delivery rates well below costs of delivery to keep customers satisfied. The seriousness of the problem can be illustrated by an example of the Marion, Ohio PCA which charges $.60 a loaded mile for delivery. The manager, Jim McElroy, related that they would need to charge $2.00 a loaded mile to pay for the delivery expenses, the association incurs.

The uncertainty of future costs is faced by all businesses and this is a key consideration that experience will bear out. Inflation and inexperience with leasing programs on the part of the local PCAs are important factors. Repair costs are a major factor. Some repairs are needed because of deterioration, rust, and accidental breakage. Repair costs such as batteries, spark plugs, etc. are directly associated with the amount of use. Costs of other repairs such as major overhauls increase as the machine becomes older. Another factor is the fact that the equipment has to be kept in peak operating condition at all times to prevent breakdowns and keep customers content.

The PCA rental manager must be aware of the fixed costs the program will have, including taxes insurance, and housing of machinery. Each PCA will have its own unique situation regarding taxation. Taxes may include tangible personal property and intangible personal property taxes besides income taxes.

Housing costs should be accounted for even if it is not provided. Some references indicate that housing may increase the life of the machine as much as 10%, which would be reflected in the trade in value. Housing costs are a function of the square footage required to house the individual machines. These costs will average about 1.5 percent of the remaining value of the machinery at the beginning of each year (Schwart, 1972). Insurance is a must for the PCA especially for liability coverage. Machinery could be involved in accidents resulting in liability claims. The common rate is $5 per $1,000 of valuation or 0.5% of the remaining value of machinery at the beginning of each year.

Labor and fuel costs will be borne by the renter for actual machine operation. Labor used for hauling machinery from farm to farm is actually included as a delivery expense. Lubrication generally is an expense for the PCA.

Depending on the size and scope of the rental program, personnel will be needed to manage and operate the program successfully. This can increase the cost substantially.

Other Considerations

Another consideration is the opportunity cost of capital that should be evaluated carefully by the general manager of the local PCA. The opportunity cost of capital is the return that could be made if the capital invested in the rental program was invested in other alternative uses. For example, the original purpose of a PCA is to loan money to farmers from which the farmer will pay back interest. If the current rate of interest is 8% on these loans then the opportunity cost of capital invested in the rental program is 8%. If the objectives of the rental program are profit

oriented and if it can only return 5% then the program may need further review.

Investment credit and depreciation are major tax consideration for PCAs. The effect of investment credit is to reduce the federal tax bill by a certain percentage of qualified investment for the year. The percentage was 7% until 1975 when it was raised to 10%. There are certain ramifications that may or may not make it useful to the PCA. If the useful life of the property is seven years or more, all the investment qualifies, if five to seven years 1/3 of the investment qualifies. The tax credit can be carried forward to future years to balance out this potential source of income. The rental program manager then faces the decision of choosing two alternatives if the investment credit makes a substantial savings:

1. Increase the profitability of the program, retain these profits, and pay higher taxes or:
2. Pass the savings on to the farmer in the form of lower rental fees.

Depreciation is a tax deductible expense that measures the amount by which the value of a machine decreases with the passage of time (Hunt, 1973). The decline in value is attributable to wear and tear on the machine, obsolesence, and increased operating expenses due to age. Different methods of calculating depreciation can be used. Using the double declining method, the investment has rapid depreciation in the first half at its depreciable life contrasted to the straight line method which provides for equal amounts of depreciation each year. The remaining value at the

end of economic life is the salvage value. The manager must determine the profitability of the rental program and work with the PCA General Manager in determining how to most effectively use depreciation and investment credit to minimize the tax burden of the association.

Warranties are another factor that should be considered when evaluating a machinery rental program. Their effect is to pay for expenses and/or costs of repairs due to faulty manufacture for a stated period of time thereby reducing the expense of the PCA. These will vary on different pieces of equipment. Generally, warranties will have a certain time period of coverage such as six months or a year after purchase. Coverages for paying on parts and labor due to faulty equipment will vary on equipment and its manufacturer.

To take an objective look at investments of this magnitude using net present value and internal rate of return methods requires careful study of expected cash flows. Each PCA will have its own unique situation in which to analyze such a program. A list of the assumptions used in arriving at the data precedes the actual analysis. The data should be looked on as the basic skeleton for computing the cash flows in each year. Each local PCA manager must determine his own receipts and expenses. The tax question is not shown because of the complexity of the problem. Tax credits will be determined by the present income and tax rate situation of the PCA. Some associations attempt to minimize their profits and could not make use of such factors as investment credit and depreciation of equipment in reducing the tax burden.

As mentioned previously, the models in the analysis are approximated from the Marion, Ohio PCA. The Fice-President, Jim McElroy as manager of the rental program has made a major contribution to this stuay by sharing his experiences and assumptions associated with managing a fleet of famr machinery for rental. This study has drawn heavily from his experiences particularly in rental fees and usage rates for equipment.

ASSUMPTIONS

1. Rental income was determined by multiplying an assumed rental fee (per acre, per hour, or per day) by the total number of acres, hours, or days rented annually.

2. Repair costs were calculated by using a percentage of the list price from data based on the premise that repair costs will increase with increased use (Schwart, 1972), based on "Agricultural Machinery Data" in Agricultural Engineers Yearbook, 1971. For example, tillage tools with 50 hours of use will accumulate repair costs of one percent of list price while a similar implement with 1000 hours of use will accumulate repair costs of 48.7 percent of list price.

3. Trade-in values are based on "Agricultural Machinery Data" in Agricultural Engineers Yearbook 1971. These are calculated by using a percent of the manufacturers list price according to planned years of use. For example, a disc would be worth 41.6 percent of the manufacturers list price after three years of use.

4. Housing costs are assumed to be 1.5 percent of the remaining value of machinery at the beginning of each year.

5. Insurance is estimated at an annual cost of .5 percent of the remaining value of machinery at the beginning of each year.

6. To determine the hours of usage for equipment rented on a per acre basis, a simple formula was used.

$$\text{Machine Capacity (acres per hour)} = \frac{\text{Width of Machine (inches)} \times \text{Speed m.p.h.} \times \text{Field Efficiency}}{100}$$

Field efficiency is the percentage of the theoretical field work accomplished after deducting for losses resulting from failure to use the full width of the machine, turning and idle travel at the ends, clogging, adjusting seed or fertilizer, unloading harvested crops, machine adjustments and minor repairs, lubrication and other minor interruptions (Schwart, 1972).

For each implement evaluated, typical speeds and field efficiencies were obtained from "Agricultural Machinery Data" Agricultural Engineers Yearbook 1971 and Modern Concepts of Farm Machinery Management by Wendell Bowers.

7. Manpower costs are calculated by adding both costs of management and labor and assigning these costs to each implement in the program. The analysis assumes a rental program with a $60,000 investment in equipment that includes 10 implements. The assumed total cost of management, $4000 yearly was calculated by determining the salary and fringe benefits of the person managing the program. Because of the small scale program, it was further assumed that this person on the average will spend one fourth of his time working on the rental program in coordination of activities and evaluating the investment in the various machines. A salary of $13,500 and fringe benefits of $2,500 total $16,000 annually. One fourth of $16,000 or 4,000 was then divided equally among each implement in the program. Although each machine has different usage rates certain tasks of management (purchasing, planning and evaluating) must be performed, and they are unrelated to the amount of usage. Labor costs are assigned to each implement based on the number of hours of labor needed to keep the machine rented. Examples of variables that determine labor costs are usage rates and necessary operational instruction time.

8. Other costs would include those expenses of conducting the rental program besides those previously mentioned, added together and distributed equally to each implement. Examples of these

costs would be advertising, licenses, telephone, office supplies, and delivery costs.

9. The discount rate used in present value calculations was nine percent. This opportunity cost is within the vicinity of present interest rates that local PCAs are charging on loans.

The data from five of the assumed ten implements was used in the following analysis. The assumed income and expenses are calculated to determine cash flows based on various assumed usage rates. Net present value and internal rates of return were then calculated by discounting the cash flows using a nine percent discount rate. A breakeven analysis was performed for each implement using the net present values of the various rental usage and investment period alternatives. The resulting "breakeven rate" for each implement is the amount of rental usage the implement must generate to yield an internal rate of return equal to the opportunity cost of capital (9%) of the local PCA.

Investment periods of three and five years were compared to determine if additional insights could be provided. The importance of having equipment in top operating condition may be cause for more frequent trade-ins, such as every three years. The comparison of five year investment periods to three year periods could show which method would result in higher profits, for each machine. The three year period has the advantage of higher cash flows in the earlier years while the five year period has a larger amount of total receipts.

OFFSET DISC

The analysis of a ten foot wide offset disc was accomplished using assumed annual rental rates of 1000, 1250, and 1500 acres. The 1500 acres is the assumed maximum usage potential for one year. The other usage rates are different possibilities that may result due to bad weather or other factors that would reduce need. The assumed retail list price was $4,660. The actual price paid for the disc was $4,200.

The projected cash flows attempt to predict costs and receipts which may occur in actual operation. Although insurance and housing costs decrease due to the depreciated value, repair costs are expected to substantially increase over time. These costs increase at a decreasing rate as evidenced by those repair costs for 1000 acres of rental a year with costs of $350 the first year followed by $504 and $581 in the second and third years. The repair cost factor causes net cash flows to decrease in later years of the investment period

Another important observation is the fact that total net cash flows of the disc kept for five years were higher than cash flows on the disc if kept for only three years. In comparing the cash flows of the three year and five year periods it should be noted that insurance and housing costs are different due to different depreciation schedules for the two periods. All other costs remain the same.

In TABLE 1, cash flows for 1000 acres rental per year over a three year period are discounted resulting in a $537.50 net present

TABLE 1. PRESENT VALUE OF PROJECTED CASH FLOWS FOR AN OFFSET DISC USING A NINE PERCENT DISCOUNT RATE: 1000 ACRES ANNUAL RENTAL, THREE YEAR EXPECTED LIFE.

	Start	Year 1	Year 2	Year 3
Receipts (a)		$2,500	$2,500	$2,500
Salvage Value				1,943
Expenses				
Insurance		21	17	13
Housing		63	52	40
Repairs (b)		350	504	581
Manpower (c)		580	580	580
Other		100	100	100
Total		1,114	1,253	1,314
Net Cash Flow	-$4,200	1,386	1,247	3,127
Present Value of Cash Flows	-$4,200	1,271.56	1,049.57	2,416.16

Net Present Value = $537.50

a. Equals 1000 acres times $2.50 per acre rental fee.

b. Assumed that the average operator covered 3.79 acres per hour.

c. Equals $400 management plus $180 labor.

TABLE 2. PRESENT VALUE OF PROJECTED CASH FLOWS FOR AN OFFSET DISC USING A NINE PERCENT DISCOUNT RATE: 1250 ACRES ANNUAL RENTAL, THREE YEAR EXPECTED LIFE.

	Start	Year 1	Year 2	Year 3
Receipts (a)		$3,125	$3,125	$3,125
Salvage Value				1,943
Expenses				
Insurance		21	17	13
Housing		63	52	40
Repairs		424	600	706
Manpower (b)		600	600	600
Other		100	100	100
Total		1,208	1,369	1,459
Net Cash Flow	-$4,200	1,917	1,756	3,609
Present Value of Cash Flows	-$4,200	1,758.72	1,477.99	2,786.81

Net Present Value = $1,823.52

a. Equals 125 acres times $250 per acre rental fee.

b. Equals $400 management plus $200 labor.

TABLE 3. PRESENT VALUE OF PROJECTED CASH FLOWS FOR AN OFFSET DISC USING A NINE PERCENT DISCOUNT RATE: 1500 ACRES ANNUAL RENTAL, THREE YEAR EXPECTED LIFE.

	Start	Year 1	Year 2	Year 3
Receipts (a)		$3,750	$3,750	$3,750
Salvage Value				1,943
Expenses				
Insurance		21	17	13
Housing		63	52	40
Repairs		640	929	1,085
Manpower (b)		620	620	620
Other		100	100	100
Total		1,444	1,718	1,858
Net Cash Flow	-$4,200	2,305	2,032	3,835
Present Value of Cash Flows	-$4,200	2,115	1,710	2,961

Net Present Value = $2,586

a. Equals 1500 acres times $2.50 per acre rental fee.

b. Equals $400 management plus $220 labor.

TABLE 4. PRESENT VALUE OF PROJECTED CASH FLOWS FOR AN OFFSET DISC USING A NINE PERCENT DISCOUNT RATE: 1000 ACRES ANNUAL RENTAL, FIVE YEAR EXPECTED LIFE.

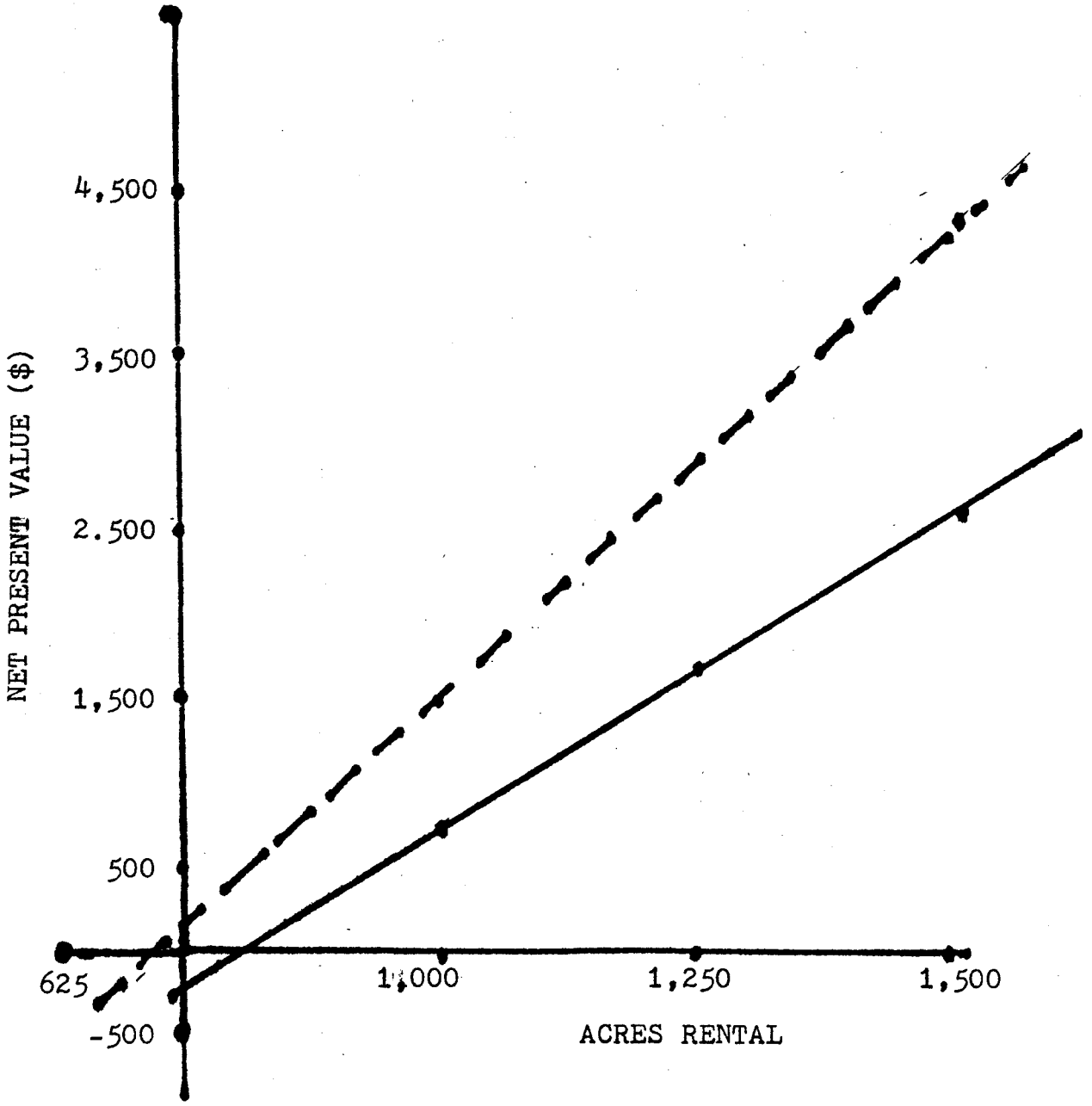
	Start	Year 1	Year 2	Year 3	Year 4	Year 5
Receipts		$2,500	$2,500	$2,500	$2,500	$2,500
Salvage Value						1,522
Expenses						
Insurance		18	16	13	10	7
Housing		55	48	38	29	21
Repairs		350	504	581	654	700
Manpower		580	580	580	580	580
Other		100	100	100	100	100
Total		1,103	1,248	1,312	1,373	1,408
Net Cash Flow	- $4,200	1,397	1,242	1,188	1,127	2,614
Present Value of Cash Flows	- $4,200	1,281.65	1,053.78	917.35	798.40	1,698.84

Net Present Value = $1,550.02

TABLE 5. PRESENT VALUE OF PROJECTED CASH FLOWS FOR AN OFFSET DISC USING A NINE PERCENT DISCOUNT RATE: 1500 ACRES ANNUAL RENTAL, FIVE YEAR EXPECTED LIFE.

	Start	Year 1	Year 2	Year 3	Year 4	Year 5
Receipts		$3,750	$3,750	$3,750	$3,750	$3,750
Salvage Value						1,522
Expenses						
Insurance		18	16	13	10	7
Housing		65	48	38	29	21
Repairs		640	929	1,085	1,199	1,295
Manpower		620	620	620	620	620
Other		100	100	100	100	100
Total		1,433	1,713	1,856	1,958	2,043
Net Cash Flow	-$4,200	2,317	2,037	1,894	1,792	3,229
Present Value of Cash Flows	-$4,200	2,125.69	1,714.50	1,462.52	1,269.50	2,098.63

Net Present Value = $4,470.83



BREAKEVEN LEVEL, THREE YEAR LIFE - 800 ACRES
BREAKEVEN LEVEL, FIVE YEAR LIFE - 725 ACRES

FIGURE 1. BREAKEVEN ANALYSIS OF AN OFFSET DISC USING NET PRESENT VALUE, AND A NINE PERCENT DISCOUNT RATE.

value. This means that if this were the actual situation, net worth would be increased by $537.50 with such an investment in the disc, assuming a nine percent opportunity cost of capital. It should be noted that in the last year's cash flow, the salvage value is included. This is the expected value of the disc at the end of the investment period and is assumed that it would be sold for cash.

In FIGURE 1, the breakeven annual rental rate is 800 acres for a three year period and 725 acres for a five year period. These figures show that it would be more profitable to rent the disc for five years rather than three. This means that the PCA must settle for lower profits if three year trade-ins become necessary.

The offset disc appears to be a very profitable investment for a rental program as evidenced by the high net present values in TABLES 1-5 and the internal rates of return in TABLE 23. FIGURE 1 shows that at rental usage of greater than 800 acres annually, the offset disc will yield a higher return than the PCA could expect from an alternative source.

SEEDER

The Brillion Seeder with a list price of $1,767 and actual cost of $1,595 can be an unprofitable investment based on Marion PCA's first year of experience and is looked on as a minimum usage rate that would hopefully increase to 200 or 400 acres as the program becomes accepted. Negative cash flows resulted in many of the alternatives because of limited use, coupled with costs that were substantially higher than the incoming receipts. At 400 acres annual rental and a five year investment period, the

TABLE 6. PRESENT VALUE OF PROJECTED CASH FLOWS, USING A NINE PERCENT DISCOUNT RATE, FOR A SEEDER, 100 ACRES ANNUAL RENTAL, THREE YEAR EXPECTED LIFE.

	Start	Year 1	Year 2	Year 3
Receipts (a)		$250	$250	$250
Salvage Value				664
Expenses				
Insurance		8	6	5
Housing		24	18	15
Repairs (b)		11	11	11
Manpower (c)		425	425	425
Other		100	100	100
Total		568	560	556
Net Cash Flow	-$1,595	- 318	- 310	358
Present Value of Cash Flows	-$1,595	- 291.74	-260.92	276.44

Net Present Value = $-1,871.22

a. Equals 100 acres times $2.50 per acre rental fee.

b. Assumed that the average operator covered 3.78 acres per hour.

c. Equals $400 management plus $25 labor.

TABLE 7. PRESENT VALUE OF PROJECTED CASH FLOWS, USING A NINE PERCENT DISCOUNT RATE, FOR A SEEDER, 200 ACRES ANNUAL RENTAL, THREE YEAR YEAR EXPECTED LIFE.

	Start	Year 1	Year 2	Year 3
Receipts (a)		$500	$500	$500
Salvage Value				664
Expenses				
Insurance		8	6	5
Housing		24	18	15
Repairs		23	39	48
Manpower (b)		450	450	450
Other		100	100	100
Total		605	613	618
Net Cash Flow	-$1,595	- 105	- 113	546
Present Value of Cash Flows	- 1,595	- 96.33	- 95.11	421.62

Net Present Value = -$1,364.82

a. Equals 200 acres times $2.50 per acre rental fee.

b. Equals $400 management + $50 labor.

TABLE 8. PRESENT VALUE OF PRLJECTED CASH FLOWS, USING A NINE PERCENT DISCOUNT RATE FOR A SEEDER, 400 ACRES ANNUAL RENTAL, THREE YEAR EXPECTED LIFE.

	Start	Year 1	Year 2	Year 3
Receipts (a)		$1,000	$1,000	$1,000
Salvage Value				664
Expenses				
Insurance		8	6	5
Housing		24	18	15
Repairs		60	99	125
Manpower (b)		500	500	500
Other		100	100	100
Total		692	723	745
Net Cash Flow	-$1,595	308	277	831
Present Value of Cash Flows	-$1,595	282.57	233.15	709.64

Net Present Value = -$369.65

a. Equals 400 acres times $2.50 per acre rental fee.

b. Equals $400 management plus $100 labor.

TABLE 9. PRESENT VALUE OF PRLJECTED CASH FLOWS USING A NINE PERCENT DISCOUNT RATE FOR A SEEDER 100 ACRES ANNUAL RENTAL FIVE YEAR EXPECTED LIFE.

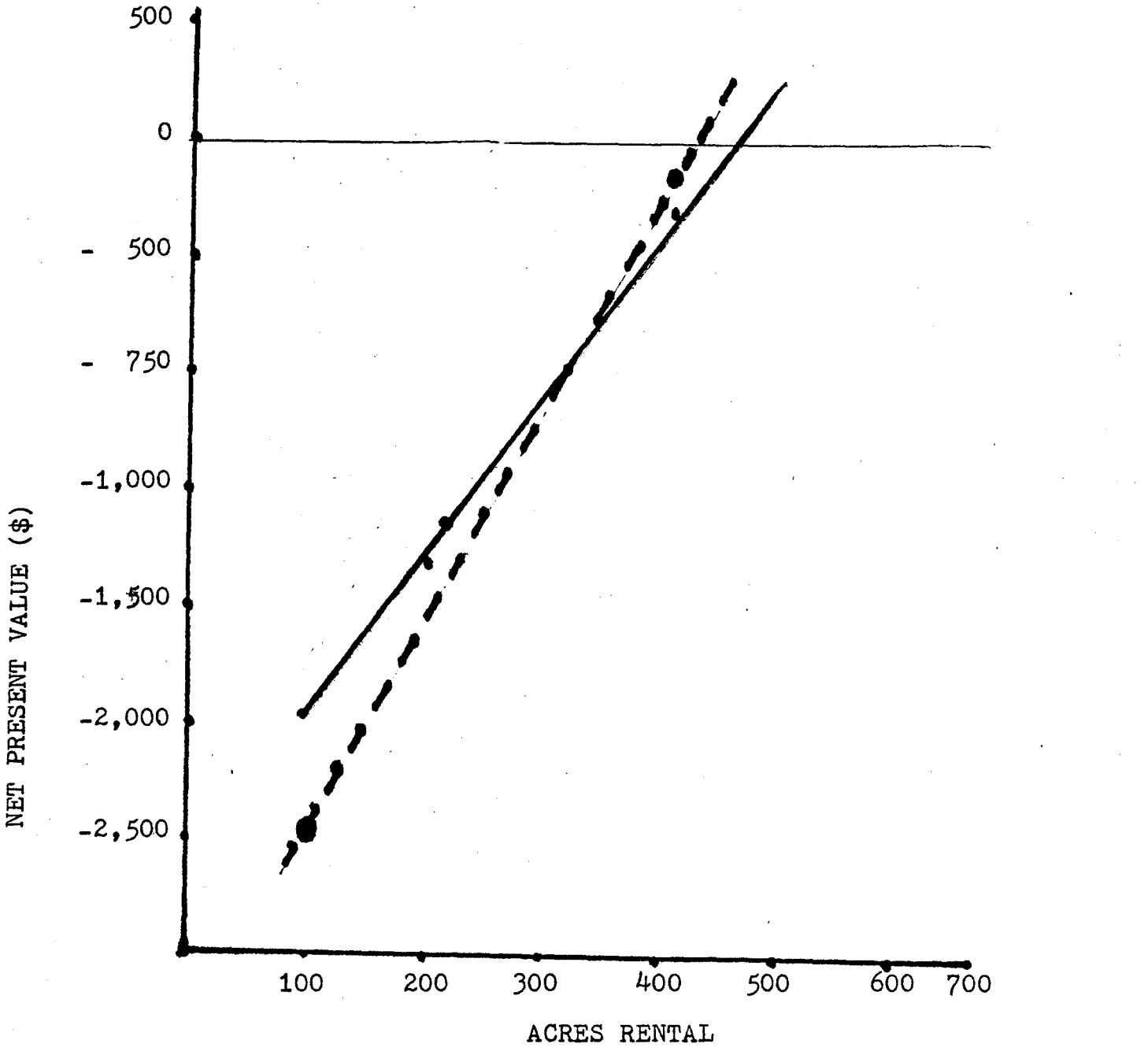
	Start	Year 1	Year 2	Year 3	Year 4	Year 5
Receipts		$250	$250	$250	$250	$250
Salvage Value						576
Expenses						
Insurance		8	6	5	4	3
Housing		24	18	15	13	12
Repairs		11	11	11	18	23
Manpower		425	425	425	425	425
Other		100	100	100	100	100
Total		568	560	556	560	563
Net Cash Flow	-$1,595	- 318	- 310	- 306	- 310	263
Present Value of Cash Flows	- 1,595	- 291.74	- 260.92	- 236.29	- 219.61	170.93

Net Present Value = - $2,432.62

TABLE 10. PRESENT VALUE OF PROJECTED CASH FLOWS USING A NINE PERCENT DISCOUNT RATE FOR A SEEDER, 400 ACRES ANNUAL RENTAL, FIVE YEAR EXPECTED LIFE.

	Start	Year 1	Year 2	Year 3	Year 4	Year 5
Receipts		$1,000	$1,000	$1,000	$1,000	$1,000
Salvage Value						576
Expenses						
Insurance		8	6	5	4	3
Housing		24	18	15	13	12
Repairs		60	99	125	133	154
Manpower		500	500	500	500	500
Other		100	100	100	100	100
Total		692	723	745	750	769
Net Cash Flow	-$1,595	308	277	255	250	807
Present Value of Cash Flows	-$1,595	282.57	233.15	196.91	177.11	524.49

Net Present Value = -$180.78



BREAKEVEN LEVEL, THREE YEAR LIFE - 475 ACRES ANNUAL RENTAL
BREAKEVEN LEVEL, FIVE YEAR LIFE - 415 ACRES ANNUAL RENTAL

FIGURE 2. BREAKEVEN ANALYSIS OF A SEEDER USING NET PRESENT VALUE, AND A NINE PERCENT DISCOUNT RATE.

net present value is -$180.78 (TABLE 10) with an internal rate of return of 5.17%. Although it would be profitable at this level, it's return is below the breakeven opportunity cost of capital which is nine percent. All other alternatives result in a zero internal rate of return due to expense being higher than receipts (TABLE 23).

FIGURE 2 shows that for a seeder to yield a return of nine percent, it would have to be rented out for more than 415 and 475 acres depending on the investment life.

BULLDOZER

The bulldozer appears to be an excellent investment opportunity for a PCA in areas where their use could be helpful. The 800 hours annual rental taken from actual records at the Marion PCA shows net presentvalues of $8686.34 and $16,886.35 for the three and five year periods respectively. (TABLES 12 and 14). The other alternative usage rate, 500 hours was selected on the basis that it may represent a year in which bad weather resticted or demand was reduced due to less need or a low income year for farmers. Eight hundred hours represents the maximum potential usage in any one year.

Assumed list price of the dozer was $21,500 with an actual cost of $18,500. An investment of this amount in one machine necessitates the thirteen dollars per hour rental fee along with 400 and 475 hours of annual rental usage (FIGURE 3) to provide the breakeven 9% rate of return.

SIX ROW NO-TILL PLANTER

The planter with a list price of $1,777 and an assumed actual

TABLE 11. PRESENT VALUE OF PROJECTED CASH FLOWS FOR A BULLDOZER USING A NINE PERCENT DISCOUNT RATE, 500 HOURS ANNUAL RENTAL, THREE YEAR EXPECTED LIFE.

	Start	Year 1	Year 2	Year 3
Receipts (a)		$6,500	$6,500	$6,500
Salvage Value				8,944
Expenses				
Insurance		107	87	66
Housing		322	260	197
Repairs (b)		188	747	710
Manpower		650	650	650
Other		100	100	100
Total		1,367	1,844	1,723
Net Cash Flow	-$18,500	5,133	4,656	13,721
Present Value of Cash Flows	-$18,500	4,709.17	3,918.86	10,595.13

Net Present Value = $723.17

a. Equals 500 hours times $13 per hour rental fee.

b. Equals one and a half times the typical costs of a farm tractor.

c. Equals actual first year costs at Marion PCA under warranty.

d. Equals $400 managerment plus $250 labor.

TABLE 12. PRESENT VALUE OF PROJECTED CASH FLOWS FOR A BULLDOZER USING A NINE PERCENT DISCOUNT RATE: 800 HOURS ANNUAL RENTAL, THREE YEAR EXPECTED LIFE.

	Start	Year 1	Year 2	Year 3
Receipts (a)		$10,400	$10,400	$10,400
Salvage Value				8,944
Expenses				
Insurance		107	87	66
Housing		322	260	197
Repairs		300 (b)	1,661	1,561
Manpower (c)		800	800	800
Other		100	100	100
Total		1,367	1,844	1,723
Net Cash Flow	-$18,500	8,771	7,492	16,620
Present Value of Cash Flows	-$18,500	8,046.79	6,305.87	12,833.69

Net Present Value = $8,686.34

a. Equals 800 hours times $13 per hour rental fee.

b. Equals 162% of actual costs at Marion PCA

c. Equals $400 management plus $400 labor.

TABLE 13. PRESENT BALUE OF PROJECTED CASH FLOWS FOR A BULLDOZER USING A NINE PERCENT DISCOUNT RATE, 500 HOURS ANNUAL RENTAL, FIVE YEAR EXPECTED LIFE.

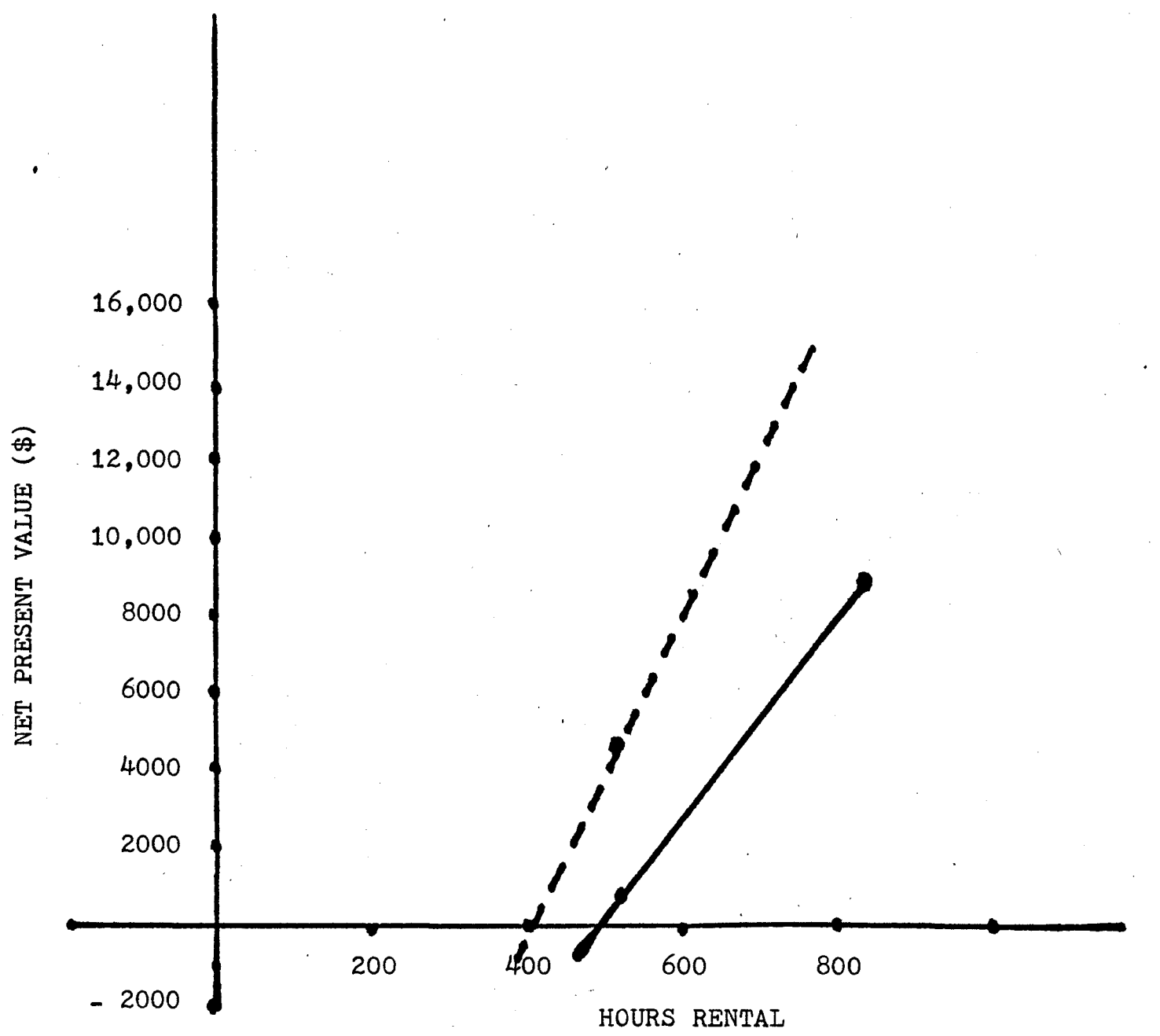
	Start	Year 1	Year 2	Year 3	Year 4	Year 5
Receipts		$6,500	$6,500	$6,500	$6,500	$6,500
Salvage Value						7,009
Expenses						
Insurance		322	243	209	174	140
Housing		107	81	70	58	47
Repairs		188	747	710	1,000	1,096
Manpower		650	650	650	650	650
Other		100	100	100	100	100
Total		1,367	1,821	1,739	1,982	2,033
Net Cash Flow	-$18,500	5,133	4,679	4,761	4,518	11,476
Present Value of Cash Flows	-$18,500	4,709.01	3,938.31	3,676.44	3,200.55	7,458.25

Net Present Value = $4,482.56

TABLE 14. PRESENT VALUE OF PROJECTED CASH FLOWS USING A NINE PERCENT DISCOUNT RATE FOR A BULDOZER, 800 HOURS ANNUAL RENTAL FIVE YEAR EXPECTED LIFE.

	Start	Year 1	Year 2	Year 3	Year 4	Year 5
Receipts		$10,400	$10,400	$10,400	$10,400	$10,400
Salvage Value						7,009
Expenses						
Insurance		322	243	209	174	140
Housing		107	81	70	58	47
Repairs		300	1,661	1,561	1,828	2,096
Manpower		650	650	650	650	650
Other		100	100	100	100	100
Total		1,479	2,735	2,590	2,810	3,033
Net Cash Flow	-$18,500	8,921	7,665	7,810	7,590	14,376
Present Value of Cash Flows	-$18,500	8,184.12	6,451.63	6,030.88	5,376.76	9,342.96

Net Present Value = $16,886.35



BREAKEVEN LEVEL, THREE YEAR LIFE - 475 HOURS ANNUAL RENTAL
BREAKEVEN LEVEL, FIVE YEAR LIFE - 400 HOURS ANNUAL RENTAL

FIGURE 3. BREAKEVEN ANALYSIS OF A BULLDOZER USING NET PRESENT VALUE, AND A NINE PERCENT DISCOUNT RATE.

cost of $1,600 appears to provide a return above the opportunity cost of capital. The one exception is the alternative of 225 acres annual use, over three year investment period, where the net present value is -$61.27 (TABLE 15). Because of the time restriction, the maximum rental usage would not likely exceeed 300 acres a year. The rental charge of 4.50 acre appears to enhance the profitability of this investment as shown in TABLES 16 - 18.

The main purpose of this machine in certain areas is for planting doublecrop soybeans after wheat. According to FIGURE 4, as long as it can be rented out for at least 200 or 215 acres depending on investment life, it will yield the nine percent expected return.

ROCKPICKER

This very specialized machine with it's limited usage potential appears unprofitable, based on the assumed data. Similar to the seeder it has high expenses in relation to its total receipts (TABLES 19 - 22). The high negative net present values result from the negative cash flows.

Investment is substantial with a list price of $4,422 and actual cost of $3,980. It should be realized that management expenses of $400 increase costs dramatically and can be questioned due to limited rental of such an item. As previously mentioned, the maximum usage possible on an annual basis would be about thirty days.

The rockpicker appears to be a questionable investment from

the standpoint of profitability. As TABLE 23 shows, it generated a zero internal rate of return on all alternatives. In FIGURE 5, the breakeven annual rental rate levels of 39 and 45 days are well above the 30 day maximum level. An implement such as this may have a place in a rental program as a service to members but must be supported by profits from other implements because of the apparent lack of ability to generate enough income at current rental fee levels.

TABLE 15. PRESENT VALUE OF PROJECTED CASH FLOWS USING A NINE PERCENT DISCOUNT RATE, FOR A SIX ROW NO-TILL PLANTER, 225 ACRES ANNUAL RENTAL, THREE YEAR EXPECTED LIFE.

	Start	Year 1	Year 2	Year 3
Receipts (a)		$1,012	$1,012	$1,012
Salvage Value				739
Expenses				
Insurance		9	7	5
Housing		27	22	15
Repairs (b)		17	25	31
Manpower		475	475	475
Other		100	100	100
Total		628	629	626
Net Cash Flow	-$1,600	384	383	1,119
Present Value of Cash Flows	-$1,600	352.29	322.36	864.07

Net Present Value = -$61.27

a. Equals 225 Acres times $4.50 per acre rental fee.

b. Assumed that the average operator covered 5.59 acres per hour.

c. Equals $400 management plus $75 labor.

TABLE 16. PRESENT VALUE OF PROJECTED CASH FLOWS USING A NINE PERCENT DISCOUNT RATE FOR A SIX ROW NO-TILL PLANTER, 300 ACRES ANNUAL RENTAL, THREE YEAR EXPECTED LIFE.

	Start	Year 1	Year 2	Year 3
Receipts (a)		$1,350	$1,350	$1,350
Salvage Value				739
Expenses				
Insurance		9	7	5
Housing		27	22	15
Repairs		23	39	48
Manpower (b)		500	500	500
Other		100	100	100
Total		659	668	668
Net Cash Flow	-$1,600	691	682	1,421
Present Value of Cash Flows	-$1,600	633.94	574.03	1,097.27

Net Present Value = $705.24

a. Equals 300 acres times $4.50 per acre rental fee.

b. Equals $400 management plus $100 labor.

TABLE 17. PRESENT VALUE OF PROJECTED CASH FLOWS USING A NINE PERCENT DISCOUNT RATE, FOR A SIX ROW NO-TILL PLANTER, 225 ACRES ANNUAL RENTAL, FIVE YEAR EXPECTED LIFE.

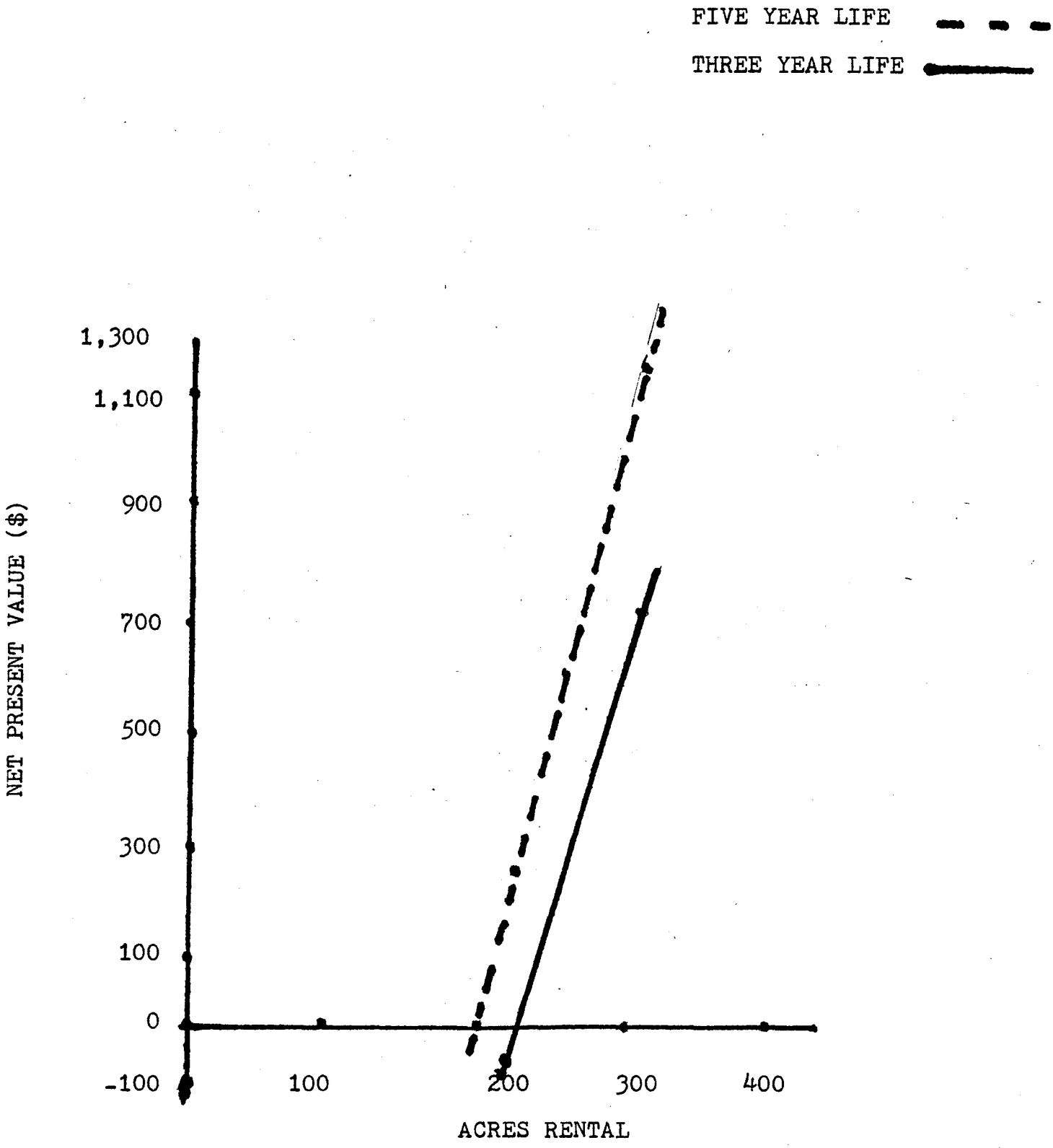
	Start	Year 1	Year 2	Year 3	Year 4	Year 5
Receipts		$1,012	$1,012	$1,012	$1,012	$1,012
Salvage Value						579
Expenses						
Insurance		9	7	6	5	4
Housing		27	21	18	15	12
Repairs		17	25	31	36	37
Manpower		475	475	475	475	475
Other		100	100	100	100	100
Total		628	628	624	631	628
Net Cash Flow	-$1,600	384	384	388	381	963
Present Value of Cash Flows	-$1,600	352.28	323.21	299.61	269.90	625.85

Net Present Value = $270.85

TABLE 18. PRESENT VALUE OF PROJECTED CASH FLOWS USING A NINE PERCENT DISCOUNT RATE, FOR A SIX ROW NO-TILL PLANTER, 300 ACRES ANNUAL RENTAL, FIVE YEAR EXPECTED LIFE.

	Start	Year 1	Year 2	Year 3	Year 4	Year 5
Receipts		$1,350	$1,350	$1,350	$1,350	$1,350
Salvage Value						579
Expenses						
Insurance		9	7	6	5	4
Housing		27	21	18	15	12
Repairs		23	39	48	55	64
Nampower		500	500	500	500	500
Other		100	100	100	100	100
Total		659	667	672	675	680
Net Cash Flow	-$1,600	691	683	678	675	1,249
Present Value of Cash Flows	-$1,600	633.92	574.88	523.55	478.17	811.72

Net Present Value = $1,422,24



BREAKEVEN LEVEL, THREE YEAR LIFE - 215 ACRES ANNUAL RENTAL
BREAKEVEN LEVEL, FIVE YEAR LIFE - 200 ACRES ANNUAL RENTAL

FIGURE 4. BREAKEVEN ANALYSIS OF SIX ROW NO-TILL PLANTER USING NET PRESENT VALUE AND A NINE PERCENT DISCOUNT RATE.

TABLE 19. PRESENT VALUE OF PROJECTED CASH FLOWS USING A NINE PERCENT DISCOUNT RATE FOR A ROCKPICKER, FIFTEEN DAYS ANNUAL RENTAL, THREE YEAR EXPECTED LIFE.

	Start	Year 1	Year 2	Year 3
Receipts (a)		$825	$825	$ 825
Salvage Value				1,840
Expenses				
Insurance		20	16	13
Housing		60	49	38
Repairs (b)		160	192	224
Manpower (c)		490	490	490
Other		100	100	100
Total		830	847	865
Net Cash Flow	-$3,980	- 5	- 22	1,800
Present value of Cash Flows	- 3,980	- 4.59	- 18.52	1,389.93

Net Present Value = -$2613.17

a. Equals 15 days times $55 per day rental fee.

b. Assumed 20% annual increase over Year 1 actual costs at Marion PCA.

c. Equals $400 management plus $90 labor.

TABLE 20. PRESENT VALUE OF PROJECTED CASH FLOWS USING A NINE PERCENT DISCOUNT RATE FOR A ROCKPICKER, THIRTY DAYS ANNUAL RENTAL, THREE YEAR EXPECTED LIFE.

	Start	Year 1	Year 2	Year 3
Receipts (a)		$1,650	$1,650	$1,650
Salvage Value				1,840
Expenses				
Insurance		20	16	13
Housing		60	49	38
Repairs (b)		320	384	448
Manpower		580	580	580
Other		100	100	100
Total		1,080	1,129	1,179
Net Cash Flow	-$3,980	570	521	2,311
Present Value of Cash Flows	-$3,980	522.94	438.52	1,784.55

Net Present Value = -$1,233.99

a. Equals 30 days times $55 per day rental fee.

b. Assumed that costs would be double those of 15 day annual rental usage.

c. Equals $400 management plus $180 labor.

TABLE 21. PRESENT VALUE OF PROJECTED CASH FLOWS USING A NINE PERCENT DISCOUNT RATE FOR A ROCKPICKER, FIFTEEN DAYS ANNUAL RENTAL, FIVE YEAR EXPECTED LIFE.

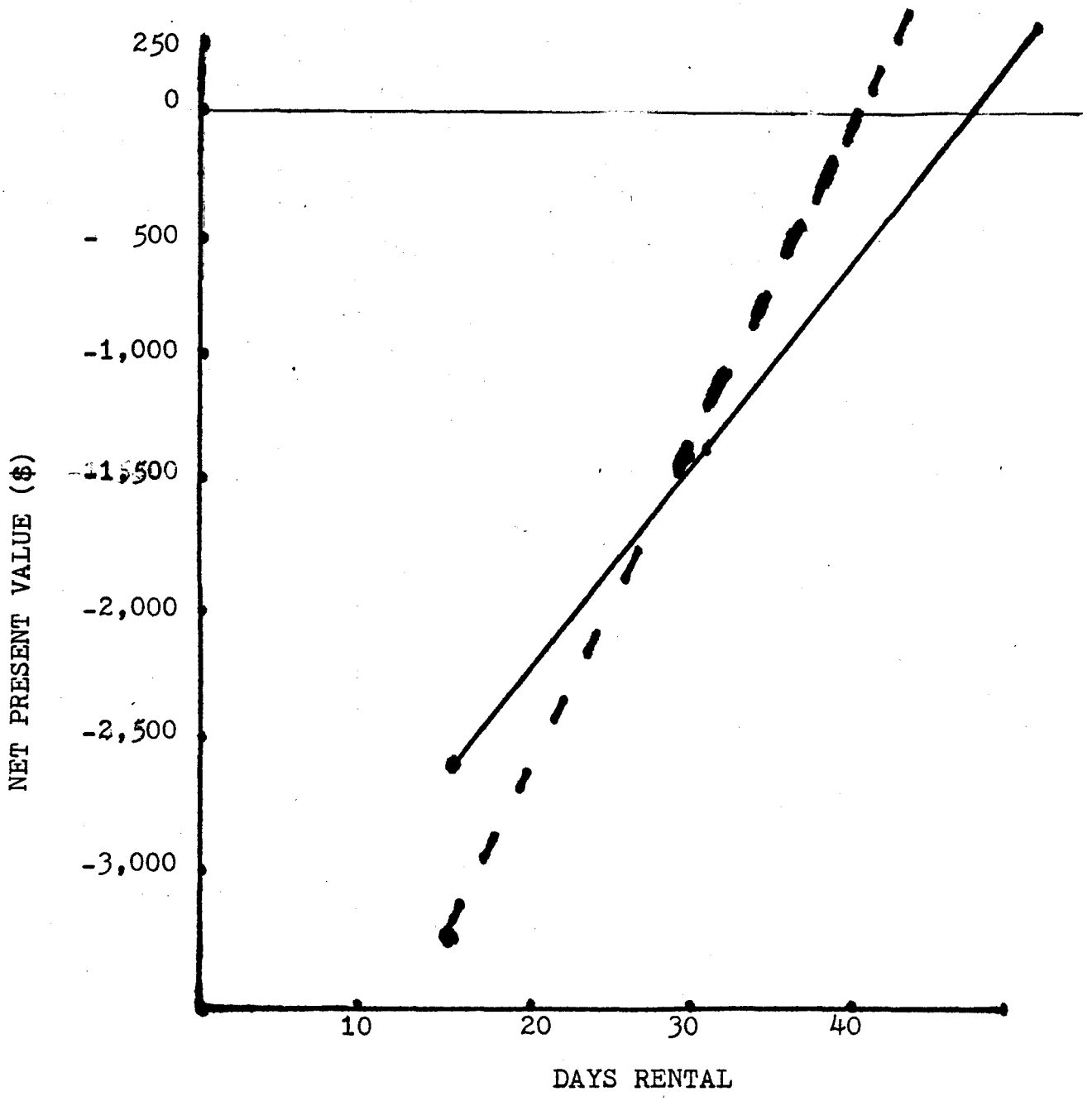
	Start	Year 1	Year 2	Year 3	Year 4	Year 5
Receipts		$825	$825	$825	$825	$ 825
Salvage Value						1,442
Expenses						
Insurance		20	17	15	12	10
Housing		60	52	44	37	29
Repairs		160	192	224	256	288
Manpower		490	490	490	490	490
Other		100	100	100	100	100
Total		830	851	873	895	917
Net Cash Flow	-$3,980	- 5	- 26	- 48	- 70	1,350
Present Value of Cash Flows	-$3,980	- 4.59	- 21.88	- 37.06	- 49.59	877.41

Net Present Value = -$3,215.72

TABLE 22. PRESENT VALUE OF PROJECTED CASH FLOWS USING A NINE PERCENT DISCOUNT RATE FOR A ROCKPICKER, THIRTY DAYS ANNUAL RENTAL, FIVE YEAR EXPECTED LIFE.

	Start	Year 1	Year 2	Year 3	Year 4	Year 5
Receipts		$1,650	$1,650	$1,650	$1,650	$1,650
Salvage Value						1.442
Expenses						
Insurance		20	17	15	12	10
Housing		60	52	44	37	29
Repairs		320	384	448	512	576
Manpower		580	580	580	580	580
Other		100	100	100	100	100
Total		1,080	1,133	1,187	1,241	1,295
Net Cash Flow	-$3,980	570	517	463	409	1,797
Present Value of Cash Flows	-$3,980	522.94	435.15	357.52	289.75	1,167.93

Net Present Value = -$1,206.72



BREAKEVEN LEVEL, THREE YEAR LIFE-45 DAYS ANNUAL RENTAL
BREAKEVEN LEVEL, FIVE YEAR LIFE - 39 DAYS ANNUAL RENTAL

FIGURE 5. BREAKEVEN ANALYSIS OF A ROCKPICKER USING NET PRESENT VALUE AND A NINE PERCENT DISCOUNT RATE.

TABLE 23. SUMMARY OF ANALYSIS METHODS FOR RENTAL EQUIPMENT

	Three Year Investment Period		Five Year Investment Period	
	Net Present Value	Internal Rate of Return	Net Present Value	Internal Rate Of Return
Offset Disc-Acres Rental				
1000 Acres	$ 537.50	15.06%	$1,550.02	21.23%
1250 Acres	1,823.52	29.38%		
1500 Acres	2,856.00	38.00%	4,470.83	43.53%
Seeder-Acres Rental				
100 Acres	- 1,871.22	0	- 2,432.62	0
200 Acres	- 1,364.82	0		
400 Acres	- 369.65	0	- 180.78	5.17%
Dozer-Hours Rental				
500 Hours	723.17	10.85%	4,482.56	16.96%
800 Hours	8,686.34	30.88%	16,886.35	37.88%
Planter-Acres Rental				
225 Acres	- 61.27	7.18%	270.85	14.47%
300 Acres	705.24	29.36%	1,422.24	36.51%
Rockpicker-Days Rental				
15 Days	- 2,613.17	0	- 3,215.72	0
30 Days	- 1,233.99	0	- 1,206.72	0

CONCLUSIONS AND IMPLICATIONS

Financial analysis can be used to better evaluate a PCA machinery rental program. By gathering information on all receipts and expenses, cash flows can be determined. The present value of these cash flows can then be calculated from which the net present value and internal rates of return are determined. These methods account for the time value of money concept which provides an additional insight in evaluating the investment.

Management should evaluate each individual implement in terms of its total value to the program. The net present value and internal rate of return methods of analysis allow the manager to easily compare the various implements in the rental program. From the analysis of this study, it can be seen that farm machines have considerable variance in terms of their profitability potential. The offset disc, dozer, and six row no-till planter appear to be profitable investments for a PCA given the assumed usage rates. The seeder and the rockpicker appear to be unprofitable investments given the assumptions of this study. The rental receipts of the latter two machines do not adequately cover their expenses.

Machinery rental programs operated by Production Credit associations have the potential of both providing service to their members and generating profits for the association. Present rental operations of PCAs are showing that rental is another alternative that some farmers need and can utilize. This has

also been proved through the use of member surveys and questionnaires. However, the potential for such a program being profitable enough to justify its existence, will depend upon the rental manager's ability to determine:

1. The needs of the local farmers.
2. The financial considerations for each individual implement.
3. The potential ability of any machine to generate adequate profit levels.

To adequately evaluate and operate a PCA rental program, the management and board of the association need to determine the objectives of their program. They must decide whether the program is to be operated for profit or service and then plan accordingly.

STUDY LIMITATIONS

Results of this study should be qualified by noting certain problems and shortcomings associated with the procedures followed. Certain factors such as income tax, depreciation, and investment credit were not considered. The complexity of these factors and how they are considered is unique of each PCA. The data and results totally reflect the assumptions given and will change accordingly as assumptions are changed. Assumed rental fees are a key factor as they will substantially affect cash flows, present values, and internal rates of return. Rental fees will vary somewhat from one area to another. Their affect was not evaluated in this study.

The analysis of the five selected implements is by no means complete as there are many more implements that have potential for being included in a rental program. Some implements will be profitable in a rental program, others will not depending on the local situation. The five machines analyzed in this study are of a highly specialized nature, whose cost cannot be easily justified by the majority of farmers hence the need for rental. Some PCAs have attempted renting a complete line of farm machinery including tractors, tillage equipment, harvesting equipment, wagons, and other general purpose machinery. Although, these types of equipment were not analyzed in this study, based on the results of the five implements in this study, certain precautions sgiykd be taken when evaluating such an approach. Whether the machine be a tractor or a baler, if there is not enough demand

from farmers to rent it or the maximum potential time period for rental will not return a profit using standard rental fees, then investment in such a machine for a formal lease program is senseless.

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